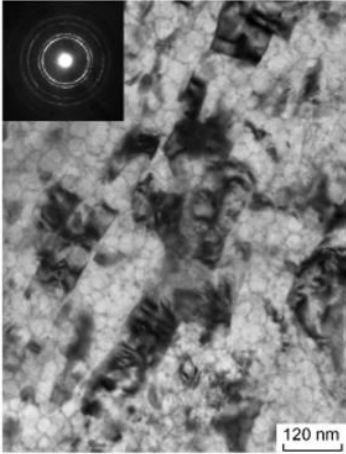
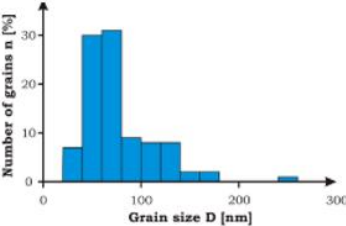
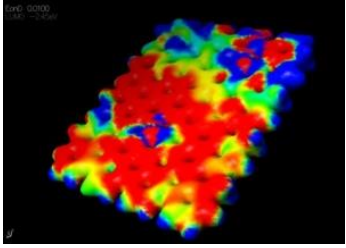


<p>name of the unit:</p> <p style="text-align: center;">INSTITUTE OF MATERIAL SCIENCE AND ENGINEERING</p> <p style="text-align: center;">Lodz University of Technology</p>		<p>symbol:</p> <p style="text-align: center;">I-11</p> <p style="text-align: center;">http://www.iim.p.lodz.pl</p>
<p>head of the unit:</p> <p style="text-align: center;">Prof. Dr hab. inż. Łukasz Kaczmarek, PhD, DSc</p>	<p>potential promoters:</p> <p style="text-align: center;">Prof. Dr hab. inż. Łukasz Kaczmarek Bożena Pietrzyk, PhD, DSc, TUL Prof. Michał Puchalski, PhD, DSc, TUL Prof.</p>	<p>contact person:</p> <p style="text-align: center;">Prof. Dr hab. inż. Łukasz Kaczmarek, PhD, DSc lukasz.kaczmarek@p.lodz.pl</p>
<p>scope of activities:</p> <p>The main area of the research activity of the Division concerns the use of:</p> <p>- carbon composites, Graphene composites (lithium -ion battery, hydrogen storage materials),</p> <p>- lightweight, functional gradient materials based on aluminum, magnesium and titanium alloys on elements exposed to wear through friction and contact fatigue. The results of these tests are protected by patents. The developed technologies have been awarded many times, incl. in 2012: gold medal and two distinctions at the 12th ITEX International Invention Show in Kuala Lumpur, Malaysia and a gold medal in Seoul, as well as a gold medal for Robot manipulator arm equipped with specially designed ultra-lightweight planetary transmission system, International Warsaw Invention Show IWIS 2016.</p>		<p>graphic material</p>  <p style="text-align: center;">10 turns with average grain size around 77 nm</p>  
<p>present activities:</p> <p>We are intensively developing works in the field of producing light composites reinforced with glass fibers and carbon composites with the addition of 2D materials, including graphene. We create composite materials with quasi-2D properties as reversible materials for storing hydrogen, as filter materials, sensors and electrodes of lithium-ion batteries.</p> <p>In addition, research and development activities include the production of ceramic coatings using the sol-gel method, as well as with the use of plasma supported by the aerosol-gel method. We have developed a number of mono and multilayer application technologies, such as based on TiO₂, Al₂O₃, ZrO₂, SiO₂, hydroxyapatite, as well as composite coatings made with, e.g. the addition of oxidized graphene flakes.</p>		
<p>Future activities:</p> <p>Development of composite materials based on quantum graphene dots from organic waste.</p>		
<p>Publications/patents, awards, projects:</p> <ol style="list-style-type: none"> 1. Łukasz Kaczmarek, Magdalena Balik et al. Functionalization Mechanism of Reduced Graphene Oxide Flakes with BF₃ center dot THF and Its Influence on Interaction with Li⁺ Ions in Lithium-Ion Batteries, <i>Materials</i> 2021, 14(3), 679; https://doi.org/10.3390/ma14030679 2. Mieczysław Jaroniek, Leszek Czechowski, Lukasz Kaczmarek, Tomasz Warga, Tomasz Kubiak, A New Approach of Mathematical Analysis of Structure of Graphene as a Potential Material for Composites, November 2019, <i>Materials</i> 12(23):3918, DOI: 10.3390/ma12233918 (IF 2,97) 3. Sebastian Lipa, Łukasz Kaczmarek, Mariusz Steglański, Hanna Radziszewska, Karol Kyzioł, Daniel Kottfer, Effect of core/shell precipitations on fatigue strength of 2024-T6I6 alloy, October 2019 <i>International Journal of Fatigue</i> 127:165-174, DOI: 10.1016/j.ijfatigue.2019.06.006 (IF 3,67) 		

4. Łukasz Kaczmarek, Tomasz Warga, Piotr Zawadzki, Magdalena Makowicz, Bartosz Bucholc, Piotr Kula, The influence of the hydrogenation degree on selected properties of graphene as a material for reversible H₂ storage, June 2019 International Journal of Hydrogen Energy 44(41), DOI: 10.1016/j.ijhydene.2019.06.007 (IF 4,08)
5. L. Kaczmarek, P. Kula et al. Creation of a 3D structure based on the High Strength Metallurgical Graphene, Surface Review and Letters April (2018) (IF 0,5)
6. M. Makowicz, M. Balik, L. Kaczmarek, et al. Spatial functionalization of graphene powder using 1,4-dichlorobutane on ceramic substrate, May (2018) Materials Chemistry and Physics (IF 2,2)
7. I.Bizyukova, O.Girka, Ł.Kaczmarek, M.Klich, M.Myroshnyk, B.Januszewicz, S.Owczarek, Aluminium and titanium alloys surface behaviour under argon and helium ion exposure Nuclear Instruments and Methods in Physics Research Section B: Beam Interactions with Materials and Atoms Volume 436, 1 December 2018, Pages 272-277 (IF 2,2)
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9. Bożena Pietrzyk, Sebastian Miszczak, Łukasz Kaczmarek, Marek Klich, Low friction nanocomposite aluminum oxide/MoS₂ coatings prepared by sol-gel method, February 2018 Ceramics International 44(7) DOI: 10.1016/j.ceramint.2018.02.055 (IF 3,057)

Keywords:

composites, graphene, functionalization, hydrogen storage, photovoltaic, lithium- ion battery.

List of internship proposal in this research team:

Co-implementation of the production and testing of physical and mechanical properties of composite materials.